OCT 03 1991

GRIFFIN INTERNATIONAL INC

October 1, 1991

Mr. Chuck Schwer
State of Vermont
Department of Environmental Conservation
Hazardous Materials Management Division
103 South Main St.
Waterbury, VT 05671-0404

Dear Chuck,

Enclosed is the report on the investigation of subsurface petroleum contamination at the West Addison General Store. The investigation was conducted by Griffin for Robinson's, Inc.

Please call me with any questions which you may have regarding the report.

Sincerely,

Peter M. Murray
Project Hydrogeologist

2B Dorset Lane • Williston, VT 05495 • 802-879-7708

REPORT ON THE INVESTIGATION OF SUBSURFACE PETROLEUM CONTAMINATION ROBINSON'S, INC. WEST ADDISON, VERMONT

September, 1991

Prepared for:

Robinson's, Inc.
P.O. BOX 405
Essex Junction, Vermont
05453

Prepared by:

Griffin International
2B Dorset Lane
Williston, Vermont 05495
(802) 879-7708

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1.0 INTRODUCTION

This report details the investigation of subsurface petroleum contamination at the West Addison General Store in Addison, Vermont. The investigation has been conducted by Griffin International, Inc. (Griffin) for Robinson's Inc. Robinson's Inc. was the owner of the gasoline underground storage tanks (USTs) which are the suspected sources of the contamination. The Vermont Department of Environmental Conservation (DEC) Hazardous Materials Management Division's (HMMD) Sites Management Section (SMS) requested this investigation be conducted in response to the discovery of subsurface petroleum contamination at the site on April 29, 1991.

In a letter to Jim Robinson dated May 17, 1991 the Vermont State SMS requested that the following determinations regarding the contamination be made as part of a limited site assessment:

1. Define the degree and extent of soil and groundwater petroleum contamination at the site.

2. Design and implement a plan to treat and dispose of the petroleum contaminated soils.

3. Conduct a risk assessment to determine the receptors threatened by the contamination.

4. If necessary, develop a remedial plan to treat the residual subsurface contamination.

5. Develop a long term monitoring program to track the contamination over time.

Griffin International has completed the State requested site assessment using a work plan submitted to and approved by the Vermont SMS. Following are the results of this investigation.

2.0 SITE BACKGROUND

2.1 Site description

The site is located on the north corner of the intersection of Route 17 and Lake Street in the town of West Addison, Addison County, Vermont (see site location maps). Several private residences and the West Addison General Store exist in the immediate vicinity of the site. All homes and businesses in the area are served by the Tri-Town water supply system which draws water from Lake Champlain's Oven Bay. Other than these few buildings, this is a rural area

consisting mostly of open farmland. Lake Champlain's Owls Head Bay lies approximately 1300' to the west.

The site straddles a north-south trending, low profile, ridge at an elevation of about 150' above mean sea level or about 55' above Lake Champlain. Depth to bedrock at the site is shallow, ranging from 2.5 to 6 feet (see well and drillers logs, appendix B). Vermont State Geologic maps indicate the underlying bedrock to be the Hortonville Formation locally combined with the Glens Falls and Cumberland Head Formations. These Ordovician age rocks consist primarily of carbonaceous slates and phyllites with occasional thin bedded limestones. Field observations confirm these rock types exist at the site. The thin overburden is mapped as glacially deposited till. This deposit was also observed at the site and forms a thin mantle over the rock ridge. Silty clay lake bottom sediments are mapped to the east and west of the hilltop.

2.2 Site History

On April 29, 1991 two 2,000 gallon gasoline USTs were excavated, removed, cleaned and taken from the site by T.L. Boise of New Haven, Vermont. Transportation of the contaminated soils was also handled by T.L. Boise. Oversight services of the tank removal were provided by Griffin International.

Inspection of the cleaned 'unleaded' tank revealed two holes and severe pitting in the bottom of the tank. The 'super unleaded' tank appeared unbreached and in relatively good condition.

The soils surrounding the former tanks were screened with a photoionization device (PID) and found to contain concentrations of hydrocarbon vapors ranging from 170 to 400 parts per million (ppm). No free product was observed in the vacant pit however, water in the bottom of the pit had a heavy petroleum sheen. 36 cubic yards of contaminated soils were removed from the tank pit and stockpiled off-site.

3.0 INVESTIGATIVE PROCEDURES

3.1 Soil Borings/Soil Screening

To help determine the degree and extent of soil contamination at the site, nine soil borings were completed by Green Mountain Boring under the supervision of a Griffin hydrogeologist (see map). This work was completed on 18 August 1991. The thin lodgement till overburden at the site was so tight that hollow stem augers would not penetrate and could not be used. This also prevented collection of split spoon samples at many soil boring locations. 3 inch

diameter solid stem augers were substituted to make the soil borings possible. All soil borings were drilled to refusal on bedrock between 2.5 and 6.0 feet. No groundwater was encountered during the soil borings, subsequently no groundwater monitoring wells were installed.

During drilling, drill cuttings were screened for volatile organic compounds (VOCs) using the PID as they were expelled from the borehole by the augers. Additionally the PID was lowered into each borehole to search for hydrocarbon vapors.

Soils encountered in the nine boreholes predominantly consisted of a silty clay lodgement till with imbedded gravel. Weathered bedrock was logged at refusal in some boreholes. Fine to medium sands were encountered locally. Well logs appear in Appendix B.

Seven of the nine boreholes yielded 0 ppm readings on the PID, indicating no petroleum contamination at these locations. Elevated PID reading of 95 and 80 ppm were observed in boreholes 4 and 7 respectively. The contaminant distribution map portrays this.

3.2 Groundwater

No water was encountered in any of the nine soil borings at the site. It appears that the overburden does not host it's own aquifer.

Observations made during the tank pull inspection indicate a hole was blasted into the bedrock to make room for the tanks when they were originally installed. Included in these observations were steep, fractured bedrock faces on all sides of the tank pit and sharp, angular chunks of bedrock debris used as back-fill when the original tanks were installed. The deepest point in the tank pit during the tank pull was 7.5 feet, considerably deeper than most of the soil borings. Standing water was observed in the pit.

The water in the pit is believed to be surface water runoff that had accumulated in the bottom of this bedrock hole. The excavation made for tank removal was made in the late spring, a period of meltwater runoff and increased monthly precipitation. The entire area overlying the tank pit is untreated, open gravel. Paved roads immediately to the east and west (see map) are also likely sources of available surface water runoff. It seems unlikely that the water in the blasted tank pit hole is a manifestation of the local bedrock aquifer since water appears so close to the surface and the pit is so shallow. No bedrock wells exist in the area to provide information about the depth to, or static water level of the local aquifer.

4.0 CONCLUSIONS

Based on the above investigation of subsurface petroleum contamination at the West Addison General Store Griffin has arrived at the following conclusions:

1. There was a release or releases of gasoline to the subsurface in the vicinity of the former UST location. The source of the release has not been positively identified but it is likely that the former USTs and/or associated underground piping were involved due to the presence of the heavy petroleum sheen on the water in the pit and the elevated PID readings taken from the soils and soil borings surrounding the tanks. The amount and duration of the release(s) are unknown.

2. The release resulted in contamination of soils immediately surrounding the tanks in the tank pit. Most of these soils were excavated during tank removal and stored off-site.

3. By removing the USTs and the contaminated soils the source of contamination has most likely been removed.

4. The thin mantle of overburden at the site, composed of relatively impermeable, compact silts and clays, does not form an aquifer. Soil contamination has apparently not spread horizontally and exists only in the immediate vicinity of the tank pit.

5. The underlying bedrock may have received petroleum contamination from the former USTs. The degree and extent of this contamination is unknown. Whether or not the bedrock's water is deep down or relatively near the surface cannot easily be determined without drilling bedrock wells in the vicinity.

6. All residential units in the vicinity of the General Store are served by the Tri-Town water system.

7. No shallow or bedrock wells appear to exist in the vicinity of this site.

5.0 RISK ASSESSMENT

The Tri-Town water system, which serves the local community, is fed by an intake pipe fifty feet out in Lake Champlain's Oven Bay. This bay is one and one quarter miles north of the former UST location and Owls Head Bay, the bay immediately to the west of the site location (see map). Due to the distance from the site to the underwater intake in

Oven Bay, Griffin feels there is no risk to the Tri-Town water supply.

No private water supply wells appear to exist in the immediate vicinity. Therefore no private water supplies appear at risk.

Lake Champlain does not appear at risk of contamination via surface water born contaminants or from lateral migration of contaminants through the overburden.

Whether or not a potential threat to Lake Champlain exists via migration of petroleum contaminants through the bedrock aquifer is difficult to assess. Determination of actual local bedrock water flow conditions would be hard to determine. Barring a nearly direct hydraulic conduit to the Lake and release of an unusually large volume of product the chance of significant amounts of contamination completing a quick migration to the Lake appears unlikely.

The possibility that contamination has not spread beyond the tank pit is also possible if bedrock beyond the pit is tight and unfractured and the amount of contaminant spill was reasonably small.

6.0 RECOMMENDATIONS

Based on the above conclusions Griffin presents the following recommendations regarding petroleum contamination at the site:

1. Conduct no further investigations in the overlying mantle of lodgement till based on the following:

   a. Contamination does not appear to have spread laterally from the tank pit as evidenced by the seven soil borings with non-detect PID readings.

   b. Most of the contaminated soil has been excavated and removed from the site.

   c. Local residences and the General Store are served by the Tri-Town water supply and are not at risk.

   d. No shallow groundwater supplies appear to exist in the vicinity of the site.

2. Conduct no further investigation of the bedrock underlying the former USTs based on the following:

   a. Local residences and the General Store are served by the Tri-Town water supply and are not at risk.

b. No bedrock water supplies appear to exist in the vicinity of the site.

c. Determination of the extent of bedrock contamination, if any, would require the drilling of a bedrock well or wells in the vicinity of the former UST and would be prohibitively expensive.

3. Given the absence of an aquifer in the overlying soils, Griffin recommends not developing and executing a long term monitoring program to track the contamination over time. The contamination does not appear to be spreading horizontally into the surrounding soils.

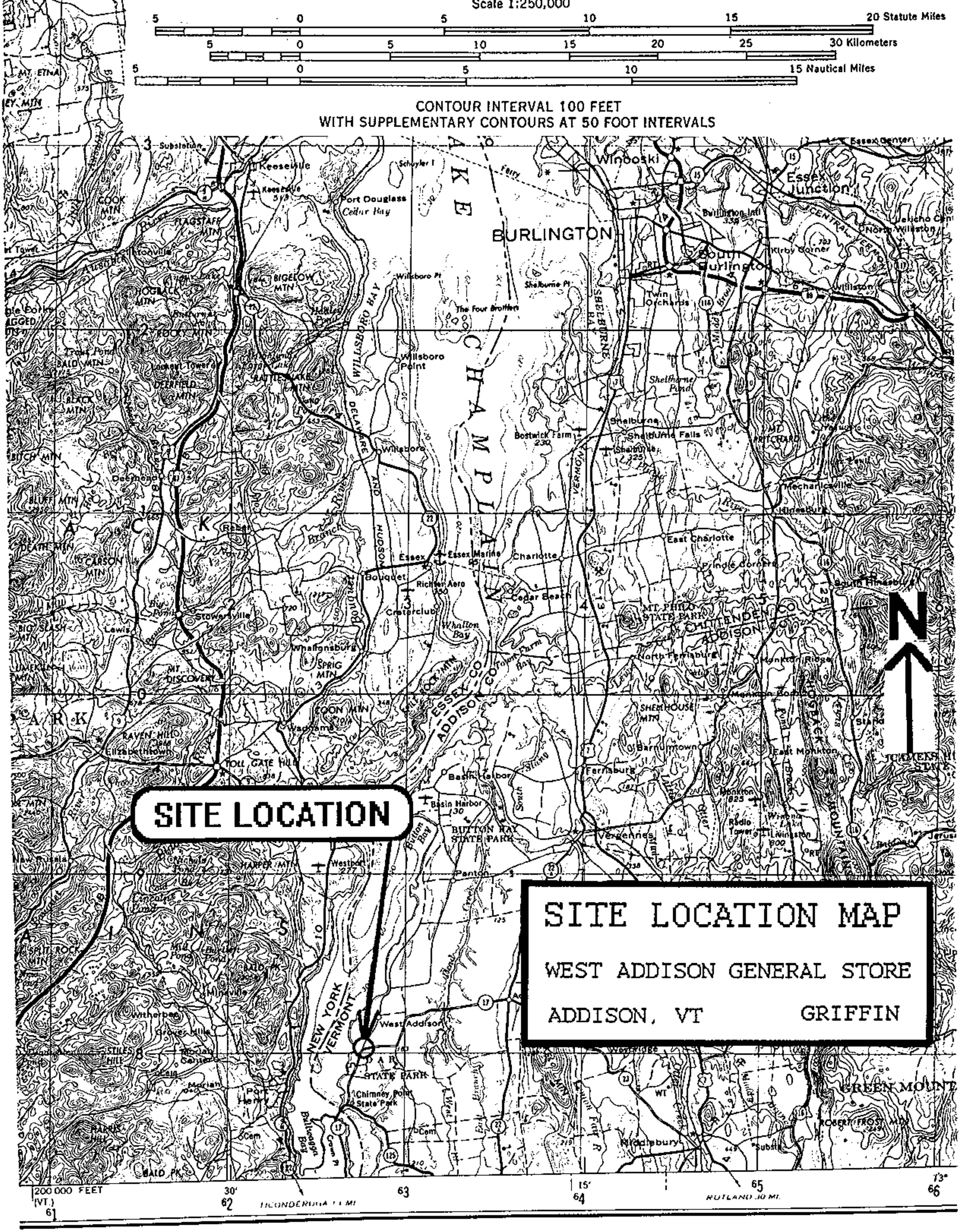
4. Remediate the contaminated soils stockpiled off-site through the process of volatilization and biodegradation.

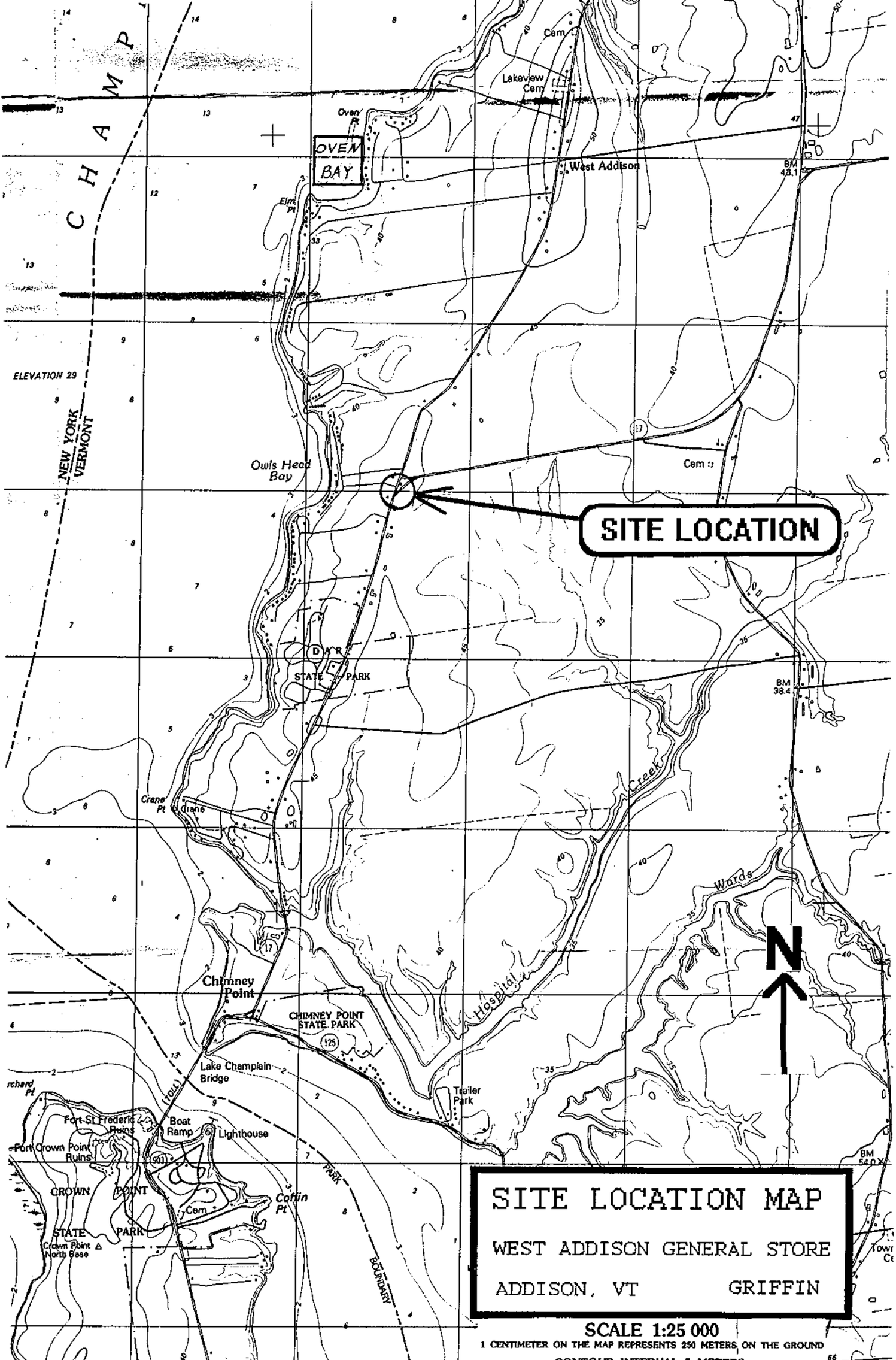
Treatment of these soils should involve polyencapsulation and quarterly overturning of the soils with a backhoe when the ground is not frozen until vapor levels are non-detect. This procedure conforms to State Interim Soil Treatment Guidelines. This work will occur on-site under the direct supervision of a Griffin environmental technician. Between treatments, the soils will be kept on, and covered with poly to prevent rainwater from leaching out contaminants.

After the soil contamination has volatilized and PID readings have become non-detect the soils can be returned to grade and landscaped.

Other than soil remediation Griffin believes that further site assessment is not necessary and recommends that no further investigation be conducted at the site.

APPENDIX A


Scale 1:250,000
20 Statute Miles
30 Kilometers
15 Nautical Miles
CONTOUR INTERVAL 100 FEET
WITH SUPPLEMENTARY CONTOURS AT 50 FOOT INTERVALS
SITE LOCATION
SITE LOCATION MAP
WEST ADDISON GENERAL STORE
ADDISON, VT GRIFFIN
N
BURLINGTON
Winooski
Essex Junction
South Burlington
Shelburne
Charlotte
Vergennes
Ferrisburg
West Addison
Willsboro
Essex
Westport
Port Henry
Elizabethtown
Keeseville
TICONDEROGA 11 MI
RUTLAND 30 MI
200 000 FEET (VT.)



SITE LOCATION MAP

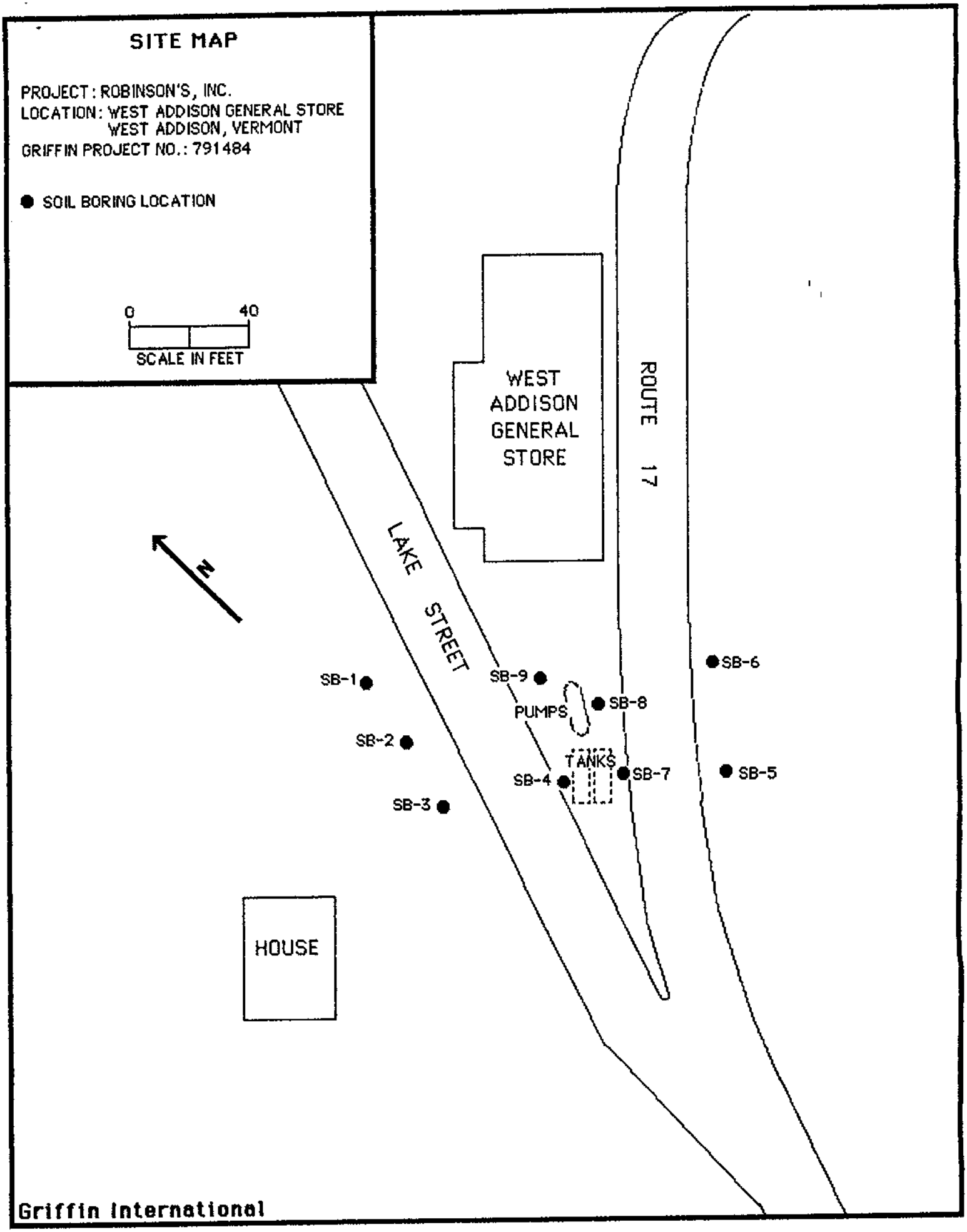
WEST ADDISON GENERAL STORE

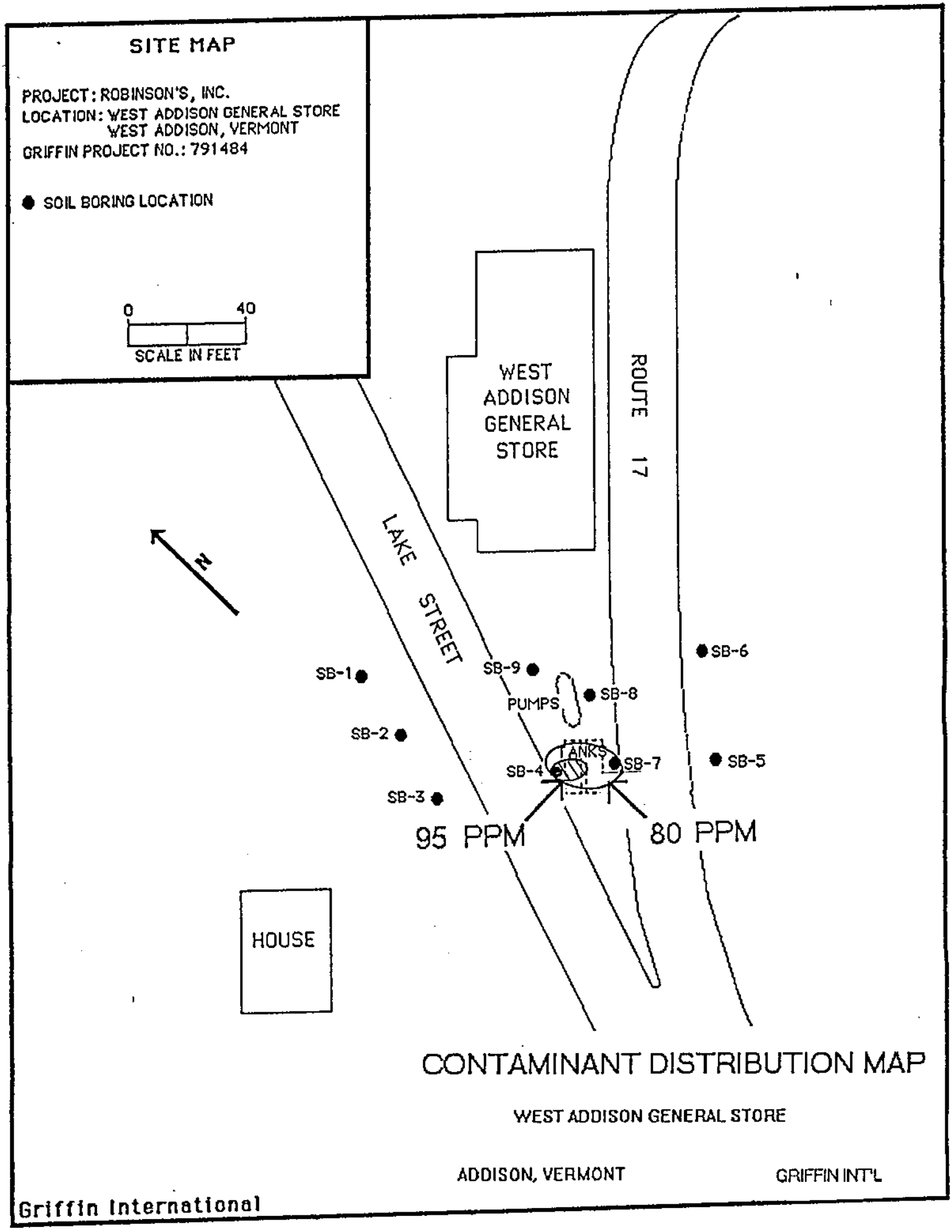
ADDISON, VT GRIFFIN

SCALE 1:25 000

1 CENTIMETER ON THE MAP REPRESENTS 250 METERS ON THE GROUND

CONTOUR INTERVAL 5 METERS


SITE MAP
PROJECT: ROBINSON'S, INC.
LOCATION: WEST ADDISON GENERAL STORE
WEST ADDISON, VERMONT
GRIFFIN PROJECT NO.: 791484
SOIL BORING LOCATION
0
40
SCALE IN FEET
WEST ADDISON GENERAL STORE
ROUTE 17
LAKE STREET
N
SB-1
SB-2
SB-3
SB-4
SB-5
SB-6
SB-7
SB-8
SB-9
PUMPS
TANKS
HOUSE
Griffin International


SITE MAP
PROJECT: ROBINSON'S, INC.
LOCATION: WEST ADDISON GENERAL STORE
WEST ADDISON, VERMONT
GRIFFIN PROJECT NO.: 791484
SOIL BORING LOCATION
0
40
SCALE IN FEET
WEST ADDISON GENERAL STORE
ROUTE 17
LAKE STREET
N
SB-1
SB-2
SB-3
SB-4
SB-5
SB-6
SB-7
SB-8
SB-9
PUMPS
TANKS
95 PPM
80 PPM
HOUSE
CONTAMINANT DISTRIBUTION MAP
WEST ADDISON GENERAL STORE
ADDISON, VERMONT
GRIFFIN INT'L
Griffin International

APPENDIX B

PROJECT WEST ADDISON GENERAL STORE

SOIL BORING NUMBER 1

LOCATION ADDISON, VERMONT

DATE DRILLED 8/19/91 TOTAL DEPTH OF HOLE 2.5'

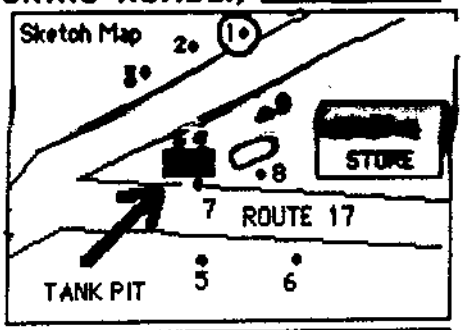
DIAMETER 3"

SCREEN DIA. N/A LENGTH N/A SLOT SIZE N/A

CASING DIA. N/A LENGTH N/A TYPE N/A

DRILLING CO. GREEN MT. BORING DRILLING METHOD SOLID STEM AUGER

DRILLER STEVE LAWRENCE LOG BY P. MURRAY



DEPTH IN FEET	SOIL BORING PROFILE	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0				
1			N/A	DENSE CLAY WITH IMBEDDED GRAVEL (LODGEMENT TILL)
2				0 PPM
3				BASE OF EXPLORATION ON WEATHERED BEDROCK AT 2.5'
4				
5				
6				
6.5				

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PROJECT WEST ADDISON GENERAL STORE

SOIL BORING NUMBER 2

LOCATION ADDISON, VERMONT

DATE DRILLED 8/19/91 TOTAL DEPTH OF HOLE 5'

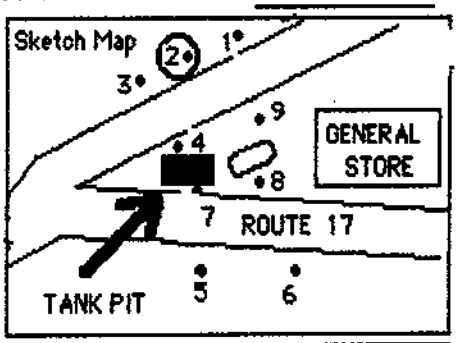
DIAMETER 3"

SCREEN DIA. N/A LENGTH N/A SLOT SIZE N/A

CASING DIA. N/A LENGTH N/A TYPE N/A

DRILLING CO. GREEN MT. BORING DRILLING METHOD SOLID STEM AUGER

DRILLER STEVE LAWRENCE LOG BY P. MURRAY



DEPTH IN FEET	SOIL BORING PROFILE	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0				
1			N/A	DENSE CLAY WITH IMBEDDED GRAVEL (LODGEMENT TILL) 0 PPM
2				
3				WEATHERED BEDROCK 0 PPM
4				
5				BASE OF EXPLORATION IN WEATHERED BEDROCK AT 5'
6				
6.5				

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PROJECT WEST ADDISON GENERAL STORE

SOIL BORING NUMBER 3

LOCATION ADDISON, VERMONT

DATE DRILLED 8/19/91 TOTAL DEPTH OF HOLE 3'

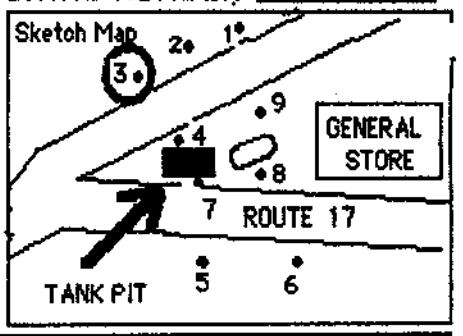
DIAMETER 3"

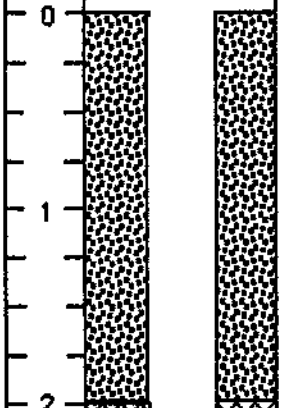
SCREEN DIA. N/A LENGTH N/A SLOT SIZE N/A

CASING DIA. N/A LENGTH N/A TYPE N/A

DRILLING CO. GREEN MT. BORING, DRILLING METHOD SOLID STEM AUGER

DRILLER STEVE LAWRENCE LOG BY P. MURRAY



DEPTH IN FEET	SOIL BORING PROFILE	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0 – 2			N/A	DENSE CLAY WITH IMBEDDED GRAVEL (LODGEMENT TILL) 0 PPM
2 – 3				.WEATHERED BEDROCK 0 PPM
3 – 6.5				BASE OF EXPLORATION IN WEATHERED BEDROCK AT 3'

Griffin International

PROJECT WEST ADDISON GENERAL STORE

SOIL BORING NUMBER 4

LOCATION ADDISON, VERMONT

DATE DRILLED 8/19/91 TOTAL DEPTH OF HOLE 6

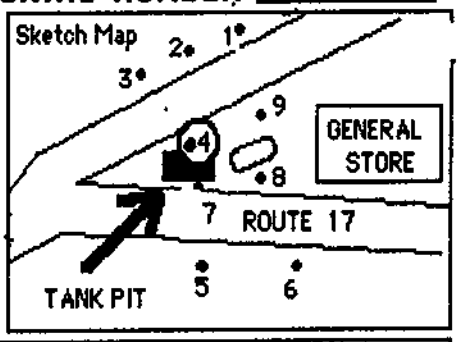
DIAMETER 3"

SCREEN DIA. N/A LENGTH N/A SLOT SIZE N/A

CASING DIA. N/A LENGTH N/A TYPE N/A

DRILLING CO. GREEN MT. BORING DRILLING METHOD SOLID STEM AUGER

DRILLER STEVE LAWRENCE LOG BY P. MURRAY



DEPTH IN FEET	SOIL BORING PROFILES	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0			N/A	HARD PACKED FILL 0 PPM
2				MOIST, SILTY CLAY WITH IMBEDDED SAND AND GRAVEL (LODGEMENT TILL) 0 PPM
4		SOILS IMMEDIATELY ON TOP OF BEDROCK HAVE ODOR		9 PPM
5				WEATHERED BEDROCK 90 PPM (IN BOREHOLE)
6				BASE OF EXPLORATION IN BEDROCK AT 4.5'
6.5				

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PROJECT WEST ADDISON GENERAL STORE

SOIL BORING NUMBER 5

LOCATION ADDISON, VERMONT

DATE DRILLED 8/19/91 TOTAL DEPTH OF HOLE 4.5'

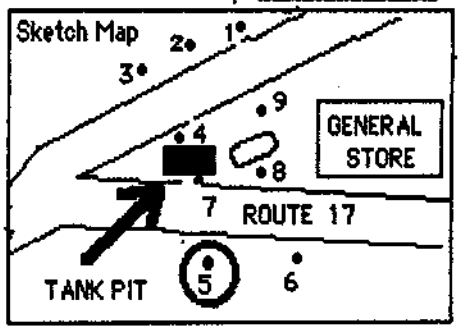
DIAMETER 3"

SCREEN DIA. N/A LENGTH N/A SLOT SIZE N/A

CASING DIA. N/A LENGTH N/A TYPE N/A

DRILLING CO. GREEN MT. BORING DRILLING METHOD SOLID STEM AUGER

DRILLER STEVE LAWRENCE LOG BY P. MURRAY



DEPTH IN FEET	SOIL BORING PROFILE	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0 – 4.5			23, 37	FINE TO MEDIUM SAND WITH SILT AND SOME GRAVEL 0 PPM
4.5 – 6.5				BASE OF EXPLORATION ON BEDROCK AT 4.5'

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PROJECT WEST ADDISON GENERAL STORE

SOIL BORING NUMBER 6

LOCATION ADDISON, VERMONT

DATE DRILLED 8/19/91 TOTAL DEPTH OF HOLE 4.5'

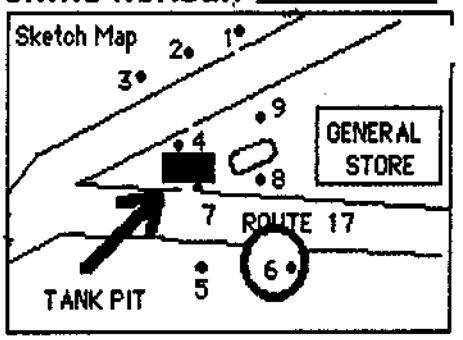
DIAMETER 3"

SCREEN DIA. N/A LENGTH N/A SLOT SIZE N/A

CASING DIA. N/A LENGTH N/A TYPE N/A

DRILLING CO. GREEN MT. BORING DRILLING METHOD SOLID STEM AUGER

DRILLER STEVE LAWRENCE LOG BY P. MURRAY



DEPTH IN FEET	SOIL BORING PROFILE	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0 – 4.5			N/A	COMPACT, BROWN SILT WITH SOME SAND, OCCASIONAL GRAVEL 0 PPM
4.5 – 6.5				END OF EXPLORATION AT 4.5 ' ON BEDROCK

Griffin International

PROJECT WEST ADDISON GENERAL STORE

LOCATION ADDISON, VERMONT

DATE DRILLED 8/19/91 TOTAL DEPTH OF HOLE 4.5'

DIAMETER 3"

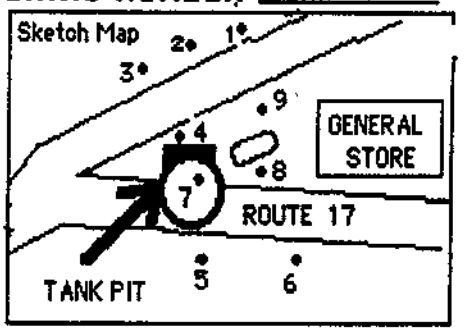
SCREEN DIA. N/A LENGTH N/A SLOT SIZE N/A

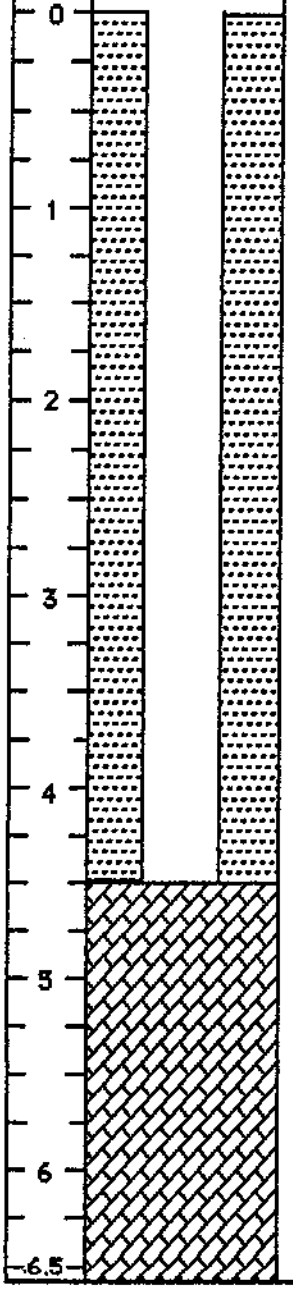
CASING DIA. N/A LENGTH N/A TYPE N/A

DRILLING CO. GREEN MT. BORING DRILLING METHOD SOLID STEM AUGER

DRILLER STEVE LAWRENCE LOG BY P. MURRAY

SOIL BORING NUMBER 7



DEPTH IN FEET	SOIL BORING PROFILE	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES).
0 – 6.5			N/A	DARK SILT AND SAND WITH SOME GRAVEL 80 PPM (IN BOREHOLE)
				BASE OF EXPLORATION ON BEDROCK AT 4.5'

Griffin International

PROJECT WEST ADDISON GENERAL STORE

SOIL BORING NUMBER 8

LOCATION ADDISON, VERMONT

DATE DRILLED 8/19/91 TOTAL DEPTH OF HOLE 4'

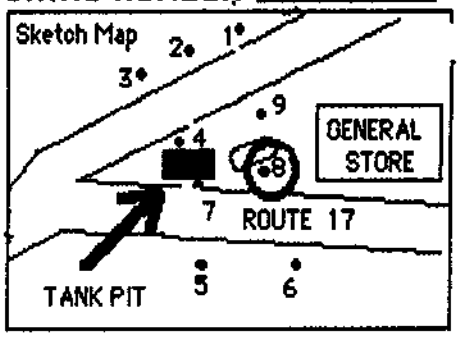
DIAMETER 3"

SCREEN DIA. N/A LENGTH N/A SLOT SIZE N/A

CASING DIA. N/A LENGTH N/A TYPE N/A

DRILLING CO. GREEN MT. BORING, DRILLING METHOD SOLID STEM AUGER

DRILLER STEVE LAWRENCE LOG BY P. MURRAY



DEPTH IN FEET	SOIL BORING PROFILE	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0 – 2			N/A	DRY, LIGHT BROWN FINE TO COARSE SAND AND GRAVEL 0 PPM
2 – 4				GRAY SILT WITH SAND, SOME GRAVEL 0 PPM
4 – 6.5				BASE OF EXPLORATION ON BEDROCK AT 4'

Griffin International

PROJECT WEST ADDISON GENERAL STORE

SOIL BORING NUMBER 9

LOCATION ADDISON, VERMONT

DATE DRILLED 8/19/91 TOTAL DEPTH OF HOLE 3'

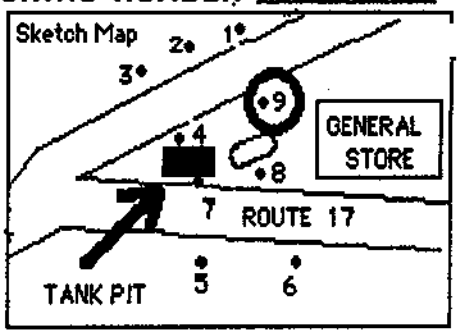
DIAMETER 3"

SCREEN DIA. N/A LENGTH N/A SLOT SIZE N/A

CASING DIA. N/A LENGTH N/A TYPE N/A

DRILLING CO. GREEN MT. BORING DRILLING METHOD SOLID STEM AUGER

DRILLER STEVE LAWRENCE LOG BY P. MURRAY



DEPTH IN FEET	SOIL BORING PROFILE	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0 – 3			N/A	LIGHT BROWN FINE TO COARSE, SILTY SAND 0 PPM
3 – 6.5				BASE OF EXPLORATION ON BEDROCK AT 3.0'

Griffin International

Green Mt. Boring Co.
D 2 Box 4447 • Barre, VT 05641
802-476-5073

le No.	Offset	Static Level		Total
-1	None	None	Auger refusal on stone at 2.5'	2.5'
-2	None	None	Auger refusal on stone at 4.5'	4.5'
-3	None	None	Auger refusal on stone at 3'	3.0'
-4	None	None	Auger refusal on stone at 6'	6.0'
-5	None	None	Auger to 4.5 - split spoon from 4.5' - 5.5' - split spoon refusal on stone at 5.5'	
			Blow counts were 23, 50.	5.5'
-6	None	None	Auger refusal on stone at 4.5'	4.5'
-7	None	None	Augered to 4.5' refusal on stone at 4.5'	4.5'
-8	None	None	Augered to 4.0' refusal on stone at 4'	4.0'
-9	None	None	Augered to 3.0' refusal on stone at 3.0'	3.0'
				37.5'

DATE: 8/19/91

CREW: Lawrence, Bernasconi

Used 4.5" solid augers

FIRM: Griffin International

PROJECT: West Addison General Store

JOB NO. 91-181